NEW TAXA IN THE GENUS *DAHLIA* (ASTERACEAE, HELIANTHEAE—COREOPSIDINAE)

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When I formulated my view on the morphological limits of *Dahlia merckii* (see Sorensen, 1969a) my concept embraced a wide assortment of specimens collected from three allopatric regions of central and northern México. Most collections came from the main center of distribution of the species, which included the lectotype locality, in the humid mountains surrounding the Vallé de México and eastward to near Orizaba in Veracruz. A second group of specimens came from the state of San Luis Potosí to the north. To date I have seen no collections which would join these two centers nor any which would join either of these with the third and northernmost region of collecting activity in the very high and poorly traversed Sierra Madre Oriental in the state of Nuevo León and Tamaulipas. Since the time when my original understanding of *D. merckii* included populations of these three regions I have learned that those collections from Nuevo León and Tamaulipas belong to a different and distantly related species herein described as the new *Dahlia tubulata* as follows:

Dahlia tubulata Sørensen *sp. nov.* TYPE: Mexico, Nuevo León; at K-7.1 along road from Diez y Ocho de Marzo to Micro-wave relay station near summit of Cerro Potosí, about 2400 m, in a zone of scrub oak and *Arbutus* with scattered *Pseudotsuga,* soil rocky red clay. 13 September 1969, *Sørensen & Beaman 6724* (HOLOTYPE: F!, ISOTYPES: A!, DEK!).

Herba perennis 6–13(–19) dm alta. Caules foliosi usque ad ramos floriferos, 3.5–7 mm diametro, internodiis 5–9.5(–12) cm longis, fistulosis vel tubulatis. Folia media pinnata vel bipinnata, petiolo incluso 8–15 cm longa; foliolis (3–)5(–7), oppositis, pinnis basilaribus 4–7 cm longis, petiolulis 6–15 mm longis, segmentis ultimis oppositis, suboppositis, vel alternis secus rhachillam; stipellis saepe praesentibus, plerumque ad nodum basilrem rhachidis affixis; petioli 3.5–7(–9) cm longis, in sectione transversali lunaribus, supra sulcatis, longistrorsum cavis (raro farctis), orificio minus quam dimidio diametri exterioris. Capitula (1)2–6 in quoque ramo principali, 4.5–6 cm diametro ligulis inclusis; involucri squammae exteriores reflexae sub anthesi, (6.5–)8–11(–13) mm longae, 1–2.1(–3.8) mm

latae. Flosculi ligulati lavanduli usque lilacini, 2–3 cm longi, 0.8–1.4 cm lati. Achenia ca. 6.5 mm longa, 1.8 mm lata. Chromosomatum numerus: $n = 16$.

Lightly wooded rocky slopes, forested ridges, and shaded ravines, sclerophyllous forest, zone of oaks, *Arbutus,* and scattered conifers, 1900-3100 m, in the Sierra Madre Oriental of Nuevo León and Tamaulipas. Flowering August-September.

EXSICCATAE. MEXICO. **Nuevo Leon:** 18 mi S of paved rd from Linares to Rte 57, along rd to Dr. Arroyo, 4 Jul 1968, *Anderson & Anderson 4630* (MICH); Cerro Potosí, near Micro-wave tower, 8 Jul 1963, *McGregor, Harms, Robinson, Rosario, & Segal 296* (MSC); 15 mi sw of Galeana, Sierra Infernillo, 16 Jun 1934, *Mueller & Mueller 837* (F, GH, MICH, TEX); trail from La Trinidad to Sierra de la Cebolla, Municipio de Montemorelos, 20 Aug 1939, *Mueller 2879* (GH, MICH, NA, UC); on Cerro Grande c. 3 mi SW of Ascensión, 18 Jul 1958, *Straw & Forman 1389* (MICH); Hacienda Pablillo, Galeana, 17 Aug 1936, *Taylor 183* (F, MO, TEX). **Tamaulipas:** just E of the border near Dulces Nombres, Nuevo León, 24° N, 99.5–100.5° W, on E side of Cerro Linadera, 9 Aug 1948, *Meyer & Rogers 1894* (F, GH, MICH, MO, US [2 sheets]); cañon 4 km W of Miquihuana, 4 Aug 1941, *Stanford, Retherford, & Northcroft 767* (F [3 photos], GH, MO, NY).

The early confusion which led to the consideration of *Dahlia merckii* and *D. tubulata* as conspecific reveals a problem which every systematist has faced at one time or another, namely, of relying too much on certain "favorite" technical characters. In the present case, *D. merckii* possessed two interesting foliar characters which I earlier considered unique among the taxa of Section *Dahlia* to which *D. merckii* belongs: 1) **hollow petioles,** otherwise typifying the "tree-dahlias" of Section *Pseudodendron;* and 2) **secondary leaflets** (pinnules) **alternate on their rachillae,** a prominent and diagnostic character among the recently established Section *Entemophyllon* (Sorensen, 1969a). The presence of these two characters among the specimens, cited above as representing *D. tubulata,* figured prominently in my former understanding of *D. merckii* as evident in the several references made by me (1969a, pp. 352–353) to exceptional material (leaf size, position of stipels, number of flowers, and the wide range in some measurements) from northern México.

The tubular characteristic of the petioles mentioned above shows up easily in dried material after soaking sections in warm water. The mature leaves of *Dahlia merckii* have a petiolar cavity which usually takes up more than one-half the outside diameter of the petiole and runs nearly its entire length from the point of attachment at the base distally to the basal rachis node. In *D. tubulata,* however, the cavity occupies a proportionately much smaller amount of the petiole diameter and occurs reliably only in the middle one-third of the axis and usually only on mature median leaves. Despite the small "bore" of the petiole this character shows up quite easily in most specimens following softening of the tissues. A very few specimens lack the character entirely.

As happens so often when one sees fresh, living materials under natural conditions versus seeing only herbarium specimens, one's perception and understanding can change remarkably. At last, when I had the opportunity to sample wild populations of *Dahlia tubulata* seeing its habit alone clearly marked it as distinct from *D. merckii.* The latter has a compact growth habit and bears its leaves low down on the stem with very short internodes. Its numerous flowering heads overtop the leafy portion of the plant on long, stiff branches devoid of true leaves. *Dahlia tubulata* bears its flowering heads on the summit of leafy stems having evenly and widely spaced nodes nearly throughout their length. Such a growth habit typifies most species of Section *Dahlia.*

In addition to the differences between these two taxa in the expression of the hollow petiole character, the character of the alternate pinnules, though shared by both, also differs between them in degree rather than in kind. Typically, *Dahlia merckii* has basal primary leaflets bearing more than two secondary leaflets (pinnules) invariably arranged alternately on their rachillae. The primary leaflets of *D. tubulata* produce only one or two (rarely three) pinnules alternately arranged and these usually not fully distinct but appearing merely as lobes. Individually the ultimate segments of each species' leaves differ in size, with those of *D. tubulata* usually having the greater amount of blade surface. Frequently the leaflets of the secondary and tertiary ranks of *D. merckii* give a rather "toothy" or lacerate appearance resulting from the differing sizes of the individual teeth. The blades of *D. tubulata,* on the other hand, have a much more rounded aspect owing to the more nearly equal size of the marginal teeth or the absence of them altogether.

Stipels (stipule-like leafy appendages attached at the base of the leaflets) occur on the leaves of many species of *Dahlia* and are often diagnostic. On *D. merckii* the conspicuous stipels may attain a size equal to or exceeding that of the secondary leaflets and are attached at *each* of the rachis nodes as well as sometimes also at the basal rachilla node. The stipels of *D. tubulata* occur only at the basal rachis node or not at all.

Finally, the chromosomal evidence argues in favor of recognizing two species. *Dahlia merckii* has a haploid number of $n = 18$ while in *D. tubulata* the number is $n = 16$. All of the species of Section *Dahlia* yield chromosome counts of $n = 16$ and/or 32 except *D. merckii*.

The morphological and cytological evidence described above amply supports the view that *Dahlia merckii* and *D. tubulata* are distinct species and, as suggested by the chromosomal evidence, that they may not even belong to the same evolutionary line. The evolutionary affinities of *D. tubulata* seem to lie with *D. sherffii,* a species which I first collected in the Sierra Madre Occidental at several locations along the well-known highway between Durango and Mazatlán (Map 1). I have based my alignment of *D. sherffii* with *D. tubulata* on the following: **1)** their general overall appearance as viewed in the field where they look more like each other than either of them resembles any other species of *Dahlia* described to date. They both grow erect with leafy stems to the flowering portions. **2)** The leaves of both species exhibit about the same degree of segmentation ranging from once to twice compound. **3)** Both species possess the character of the pinnules or pinnular segments arranged alternately on their pinnae. In *D. tubulata* this character is quite consistent and diagnostic whereas in *D. sherffii* it appears irregularly and could go unnoticed. **4)** After considering the morphological evidence the chromosomal condition in each taxon seems to suggest that *D. sherffii* represents a tetraploid ($n = 32$) race of the diploid ($n = 16$) *D. tubulata.* This attractive hypothesis awaits verification from more detailed studies than those carried out so far. Meanwhile, it is worthy to note that two other *Dahlia* species, both in Section *Dahlia,* are represented by both diploid and polyploid plants and populations: *D. australis* of southeastern México and adjacent Guatemala, and *D. coccinea,* a widespread and common roadside wildflower in México and Central America (see Sorensen, 1969b, pp. 378–387 & 397–409 respectively).

When working the keys to the species of Section *Dahlia* (Sorensen, 1969a, pp. 323–326), *Dahlia tubulata* could emerge under two different paired leads. If the specimen at hand lacked the tubular petiole, the condition of many uppermost leaves and a very few median leaves, the key would take one to *D. sherffii.* At this juncture the investigator could invoke geographic distribution (see Map 1) as a basis for separation of these taxa inasmuch as neither species has clear qualitative distinctions over the other. On the other hand, if the unknown specimen possessed the tubular petiole one would emerge from the key at *D. merckii.* At this point the growth habit would be most useful in distinguishing between *D. tubulata* and *D. merckii.* Geographic distribution figures here as well since their respective ranges do not overlap at all (See Figure 2).

The removal of *Dahlia tubulata* from *D. merckii* has resulted in the latter species now having a much narrower morphological circumscription and a greatly reduced geographic distribution. *Dahlia merckii* more than ever seems to represent an anomalous and atypical taxon when compared to the other species in Section *Dahlia.* This has led me to consider removing it to a section of its own. I believe such action would lay greater emphasis on its representing an evolutionary line slightly apart from that within Section *Dahlia.* On the basis of chemical evidence pertaining to studies on the flavonoids of *Dahlia,* Giannasi (1975) has arrived at a similar conclusion. He proposed that *D. merckii* occupy a separate subsection with Section *Dahlia.* I have chosen to follow the suggestions of Giannasi as a conservative manner in which to deal with this question and offer a description of the proposed new Subsection Merckii, as follows:

Subsection Merkii Sørensen *subsectio nova.* TYPUS: *Dahlia Merkii* Lehm.

Herba perennis. Caules plures vel multi, e radicibus tuberosis, foliosi infra medium; nodis inferioribus confertis. Folia bipinnata vel bipinnato-pinnatisecta, pinnis oppositis, pinnulis alternis; stipellis ad omnem nodum rachidis affixis, aliquando ad nodum basilarem rhachillae; petiolis cavis. Chromosomatum numerus: n = 18.

Figure 1. *Dahlia tubulata* drawn from *Sørensen & Beaman 6724*, the Holotype. On the right hand side is a leaf taken from a different plant in the same population to show the range of segmentation and the hollow petioles observed in this species.

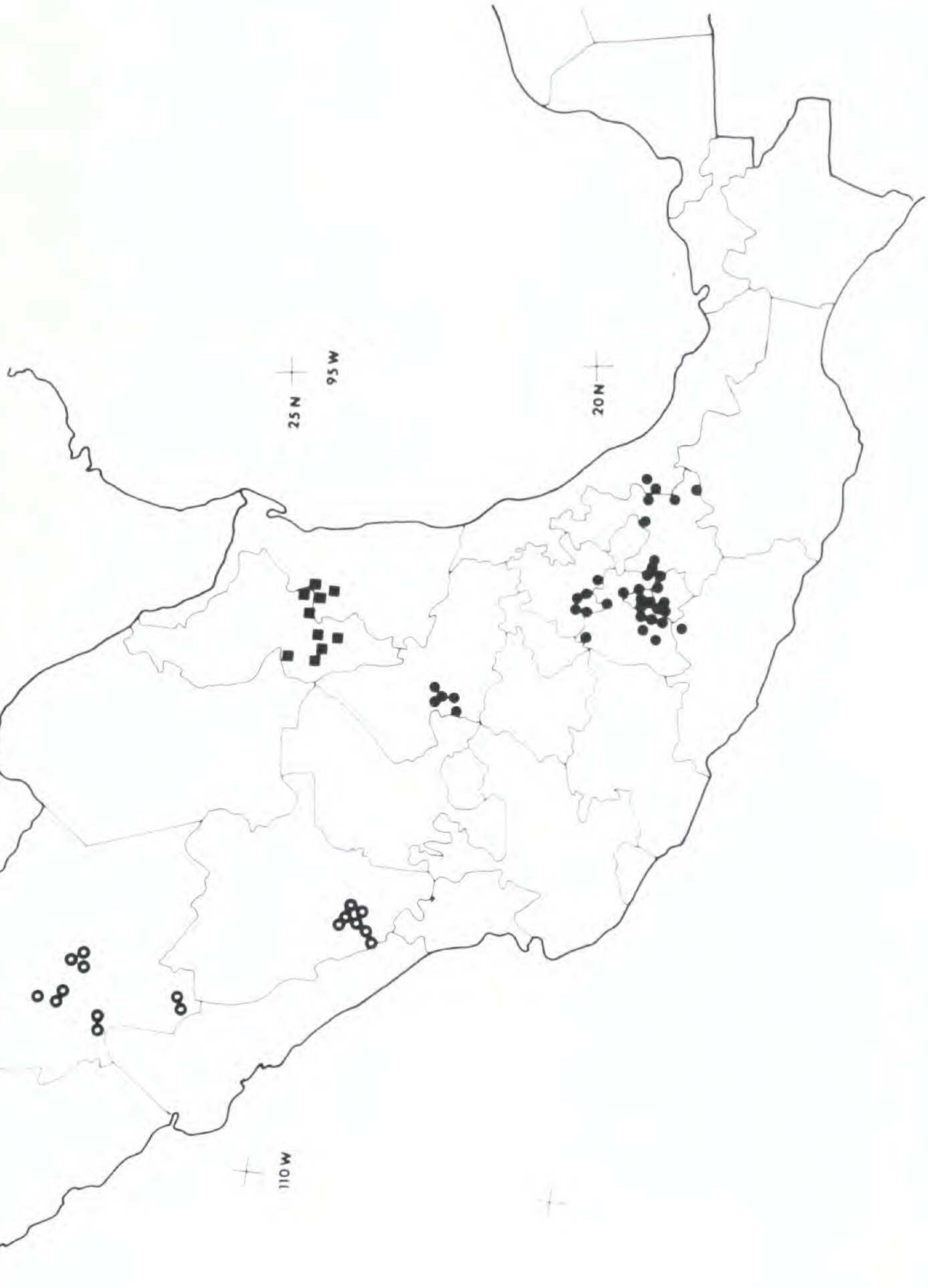

Figure 2. The geographic distribution of *Dahlia merckii* (dots), *D. sherffii* (circles), and *D. tubulata* (squares).

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REFERENCES

GIANNASI, DAVID E. 1975. The flavonoid systematics of the genus *Dahlia* (Compositae). Mem. New York Bot. Gard. **26(2):** 1–125.

SORENSEN, PAUL D. 1969a. Revision of the genus *Dahlia* (Compositae, Heliantheae—Coreopsidinae), I. Rhodora **71:** 309–365.

———. 1969b. Revision of the genus *Dahlia* (Compositae, Heliantheae—Coreopsidinae), II. Rhodora **71:** 367–416.

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